



A.D. 1866, *25th SEPTEMBER.* N^o 2458.

S P E C I F I C A T I O N

OF

HENRY TURNER.

CONSUMING SMOKE AND ECONOMIZING
FUEL.

LONDON:

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1867.





A.D. 1866, 25th SEPTEMBER. N° 2458.

Consuming Smoke and Economising Fuel.

LETTERS PATENT to Henry Turner, of Leeds, in the County of York,
for the Invention of “**IMPROVEMENTS IN APPARATUS FOR CONSUMING SMOKE
AND ECONOMISING FUEL.**”

Sealed the 15th March 1867, and dated the 25th September 1866.

PROVISIONAL SPECIFICATION left by the said Henry Turner at the
Office of the Commissioners of Patents, with his Petition, on the 25th
September 1866.

I, HENRY TURNER, of Leeds, in the County of York, do hereby declare the
5 nature of the said Invention for “**IMPROVEMENTS IN APPARATUS FOR CONSUMING
SMOKE AND ECONOMISING FUEL,**” to be as follows :—

My improved furnace for consuming smoke and economising fuel consists
of a series of retorts, into which the fuel is charged through closed hoppers, the
retorts are heated by fires placed underneath, and when partly consumed the
10 fuel is forced out of the retorts on to a grate, which consists of one or more
plates having diamond or other shaped slots ; these grates when required are
turned partly round to discharge the clinkers and cinders into the ash-pit ;
the combustible gases from the retorts pass over the incandescent fuel on the
grate or grates, and are thus consumed before passing into the flues. The

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smoke from the fire under the retorts is at first taken over the main fire-grate, and afterwards it is turned into a flue passing through the boiler or otherwise.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Henry Turner in the Great Seal Patent Office on the 23rd 5 March 1867.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, HENRY TURNER, of Leeds, in the County of York, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-fifth day of September, in the year of our 10 Lord One thousand eight hundred and sixty-six, in the thirtieth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Henry Turner, Her special license that I, the said Henry Turner, my executors, administrators, and assigns, or such others as I, the said Henry Turner, my executors, administrators, and assigns, should at any time agree 15 with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN APPARATUS FOR CONSUMING SMOKE AND ECONOMISING FUEL**," upon the condition (amongst others) 20 that I, the said Henry Turner, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately 25 after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Henry Turner, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement (that is to say) :— 30

My improved furnace for consuming smoke and economizing fuel consists of a series of retorts into which the fuel is charged through a closed hopper, the retorts are heated by a fire placed underneath, and the fuel is forced out of the retorts on to a plate, and thence on to the grate or grates, which consist of one or more plates having diamond or other shaped slots ; these 35

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grates when required are turned partly round to discharge the clinkers and cinders into the ash-pit, the combustible gases from the retorts pass over the incandescent fuel on the grate or grates, and are thus consumed before passing into the flues. The products of combustion from the fire under the retorts
5 may be taken at first over the main fire-grate, and afterwards into a flue or flues passing through the boiler to superheat the steam.

And in order that my Invention may be fully understood, and readily carried into operation, I will proceed to describe the accompanying Sheet of Drawings, reference being had to the figures and letters marked thereon.

10 Figure 1 is an end view partly in section; Figure 2 is a longitudinal elevation in section; Figure 3 is an end elevation, and Figure 4 is a plan in section of my improved apparatus for consuming smoke, economizing fuel, and superheating steam.

a is the outer shell of an ordinary two-flued boiler, and a^1 are the two
15 flues; b is the hopper into which the coal or other fuel is placed; and c, c , is a series of five or other convenient number of retorts, one end of each of which is open to the hopper, and the other end is open towards the boiler; these retorts are made by preference of cast iron, but they may be of fire-clay or other materials, and each retort is provided with a screw c^1 ; these screws
20 are turned slowly round by the shaft d , and worms d^1 gearing into the wheels c^2 as shewn in Figure 3, or in any other convenient manner to force the coal gradually from one end of the retorts to the other. Under the retorts c is the grate e , which is made of two slotted plates capable of being moved up and down on hinges to discharge the clinkers and cinders. The partly consumed
25 fuel discharged from the retorts c drops on to the plate f , and is pushed forward by the attendant on to the grates g, g , which in ordinary two-flued boilers are placed two in each flue, as shewn best in Figure 4. The grates g, g , are each made of two slotted or perforated plates which are hinged to the front and back bars, and are moved up and down occasionally to discharge the clinkers
30 and cinders. The grates e and g are held in their proper positions by levers fixed to the hinges acting against stop pins, and when it is necessary to move them up and down to discharge the clinkers and cinders, the attendant applies a box key to the square end of the hinge, and works it up and down, or to and fro. The grates e and g may be counterbalanced by levers and weights.
35 At each side of the grates g, g , I apply one or more grate bars h to fill up the space in the flues a^1 . The fuel is supplied to the grate through the door i , and the fuel is distributed over the grates g, g , through the doors j, j . The retorts c are enclosed in the fire-brick chamber or reverberatory furnace k ,

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and in order to protect the end of the boiler from the heat of the fuel discharged from the retorts, and to guide the products of combustion into the flues a^1 , I apply the fire-brick bridge l to the end of the flues as shewn in Figure 4. The products of combustion from the grate e are conveyed through the arch of the chamber or furnace k into the dome m , and thence into the pipes n , 5 one of which is in communication by means of the branch pipe n^1 , see Figure 2, with the space over the plate f to assist in igniting the gases from the retorts before they pass into the flues a^1 , dampers are fixed in these pipes so as to convey all the heat through the boiler for superheating the steam, or through the main flue to assist in igniting the gases; or if desired, both may be used 10 at one time. In order to increase the effect of the pipes n in superheating the steam, each pipe n is surrounded by a casing n^2 ; these casings are open at the ends, and the pipe n^3 conveying the steam to the engine is jointed to the casings as shewn in Figure 2, consequently the steam is superheated by coming in contact with the heated pipes n before it leaves the boiler. 15

The mode of operation is as follows:—When the boiler is first started the fire must be kindled on the grate e , and when it has been at work for a short time the fuel that has been partially consumed by passing through the retorts c , and has fallen on to the plate f , is pushed forward on to the grates g, g , and h, h , by the attendant, who for that purpose must open the doors j, j , when the 20 boiler is in full work the gases evolved by the fuel in the retorts in passing over the incandescent fuel on the grates g and h , becomes ignited before it arrives at the bridges in the flue a^1 , and the steam is superheated before it is conveyed to the engine by passing through the casing n^2 . I wish to remark here that the screws c^1 instead of being made of equal pitch and cylindrical 25 throughout their length as shewn in Figure 4, may be of a gradually increasing pitch from the front to the back, and they may also be of a conical form with the larger diameter near the boiler to allow for the expanding of the fuel by the heat, and the retorts may be formed with a chamber at the upper side to allow the gasses to pass more freely over the coals in the screw into the flues 30 of the boiler. The fuel may also be forced through the retorts by an endless chain of bucket by pistons or rams by the attendant, or in any other convenient manner.

Having thus stated the nature of my Invention, and described the manner of performing the same, I declare that I claim as my Invention the application 35 of one or more retorts heated by a separate fire to prepare the fuel before it is delivered to the grate or grates of the boiler.

Secondly, I claim conveying the products of combustion from the fire-grate

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by which the retorts are heated into the space above the grates of the boiler for consuming smoke and generating steam, and into a pipe or pipes passing through the steam in the boiler for superheating the steam.

Thirdly, I claim constructing the fire-grates with joints or hinges, and
5 hinging them to the front and back plates as shewn, and for the purposes described.

In witness whereof, I, the said Henry Turner, have hereunto set my hand and seal, this Twenty-second day of March, One thousand eight hundred and sixty-seven.

10

HENRY TURNER. (L.S.)

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FIG. 1.

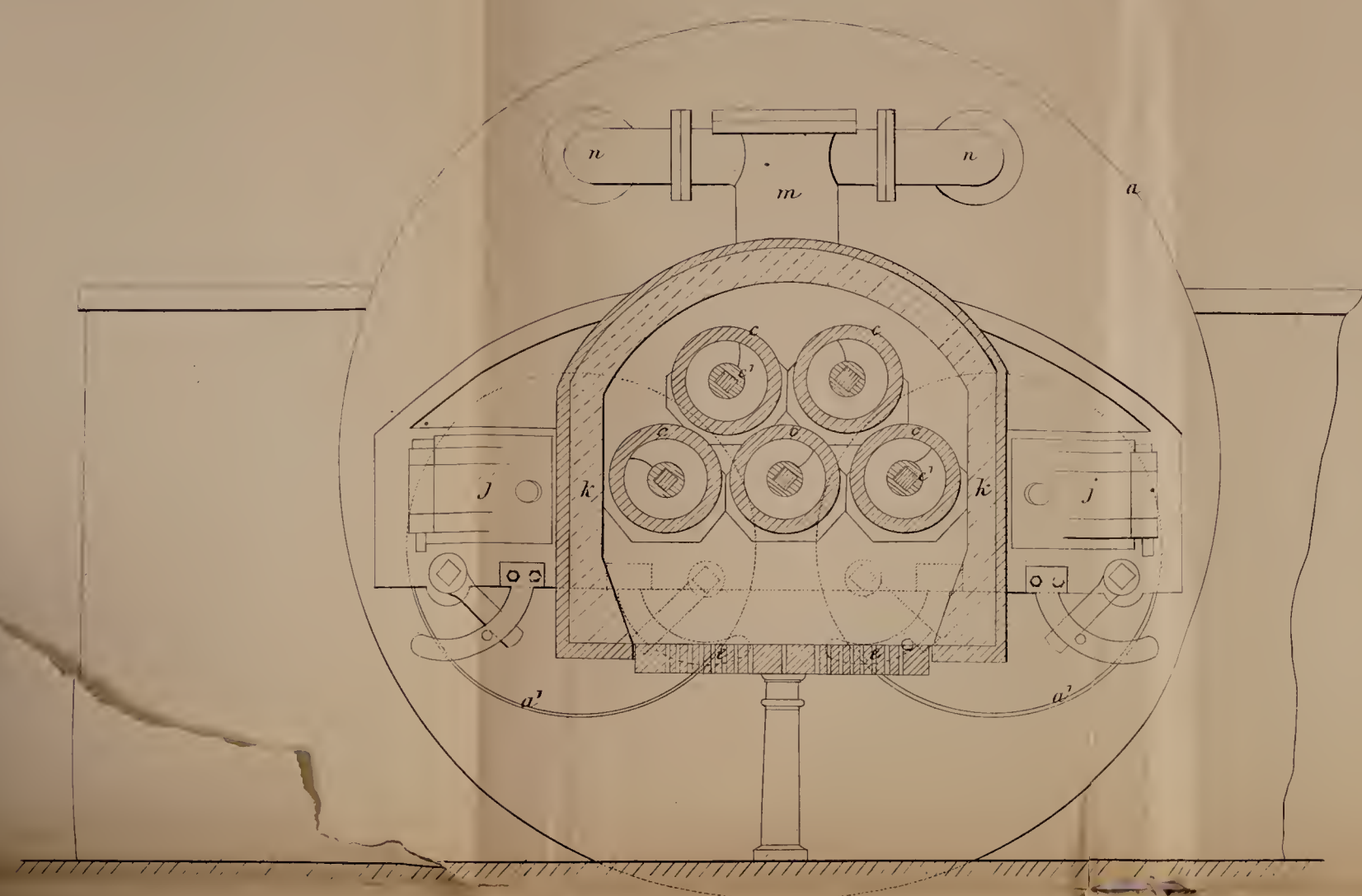


FIG. 2.

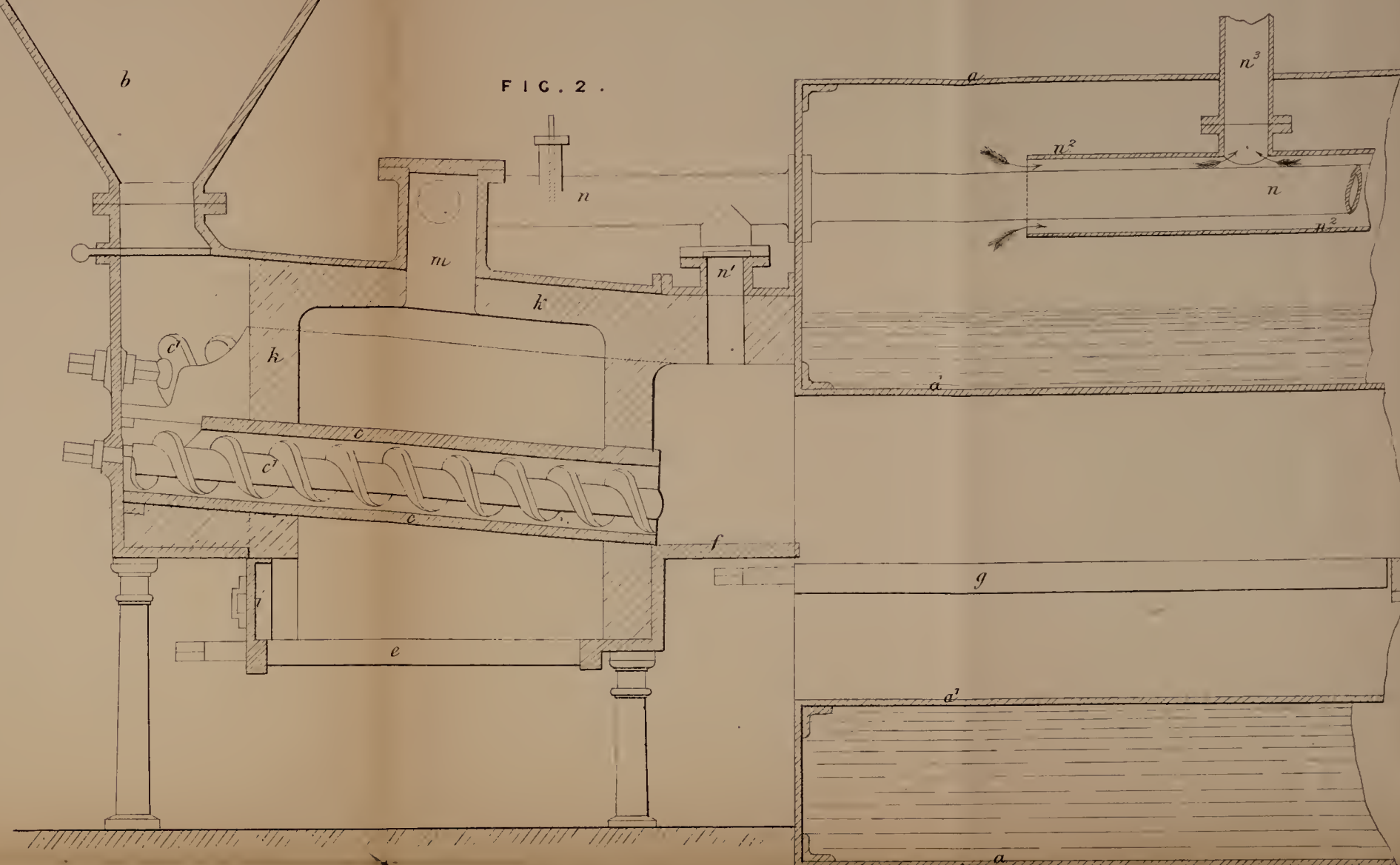


FIG. 3.

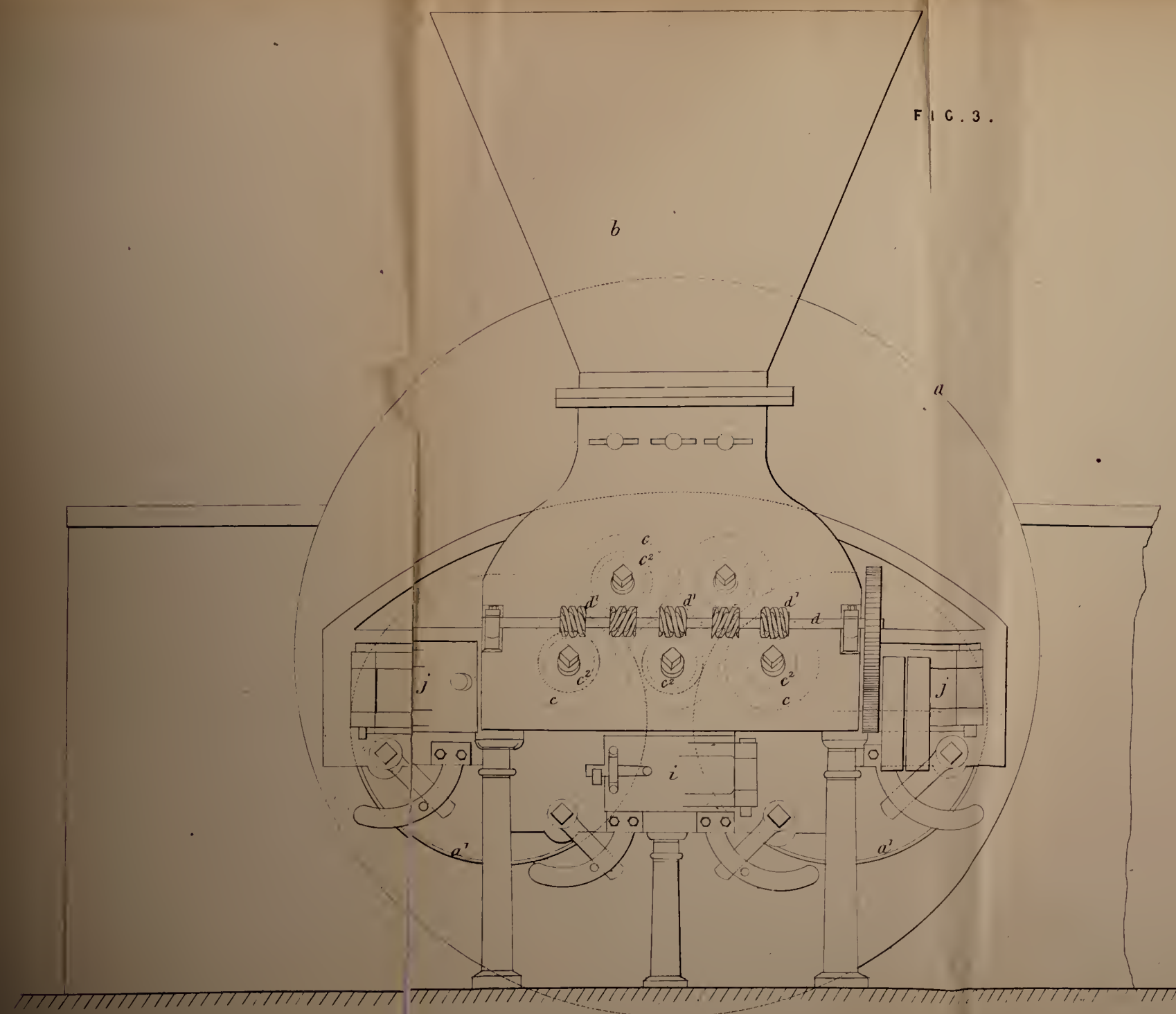
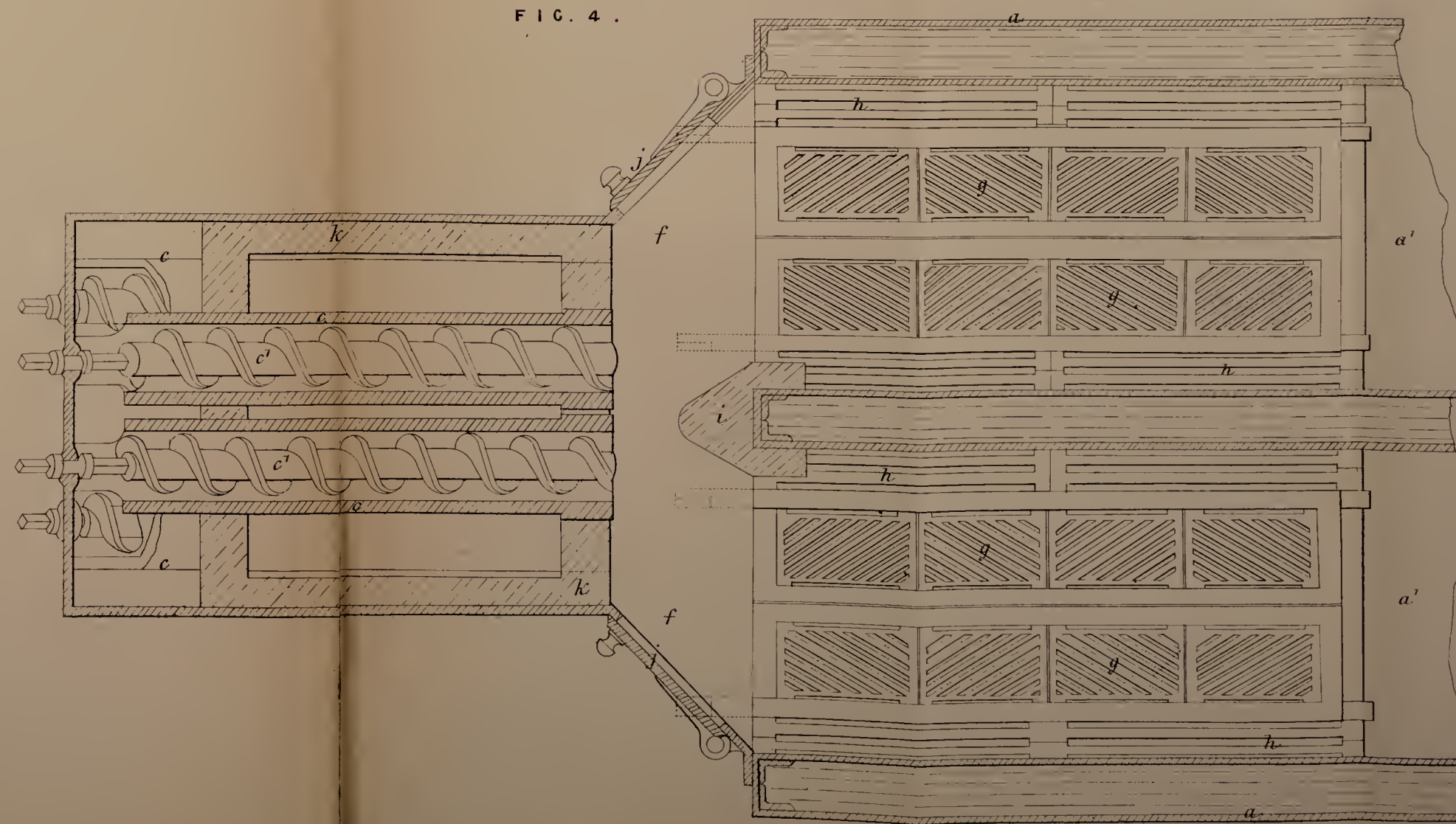


FIG. 4.



The said drawing is not colored.

